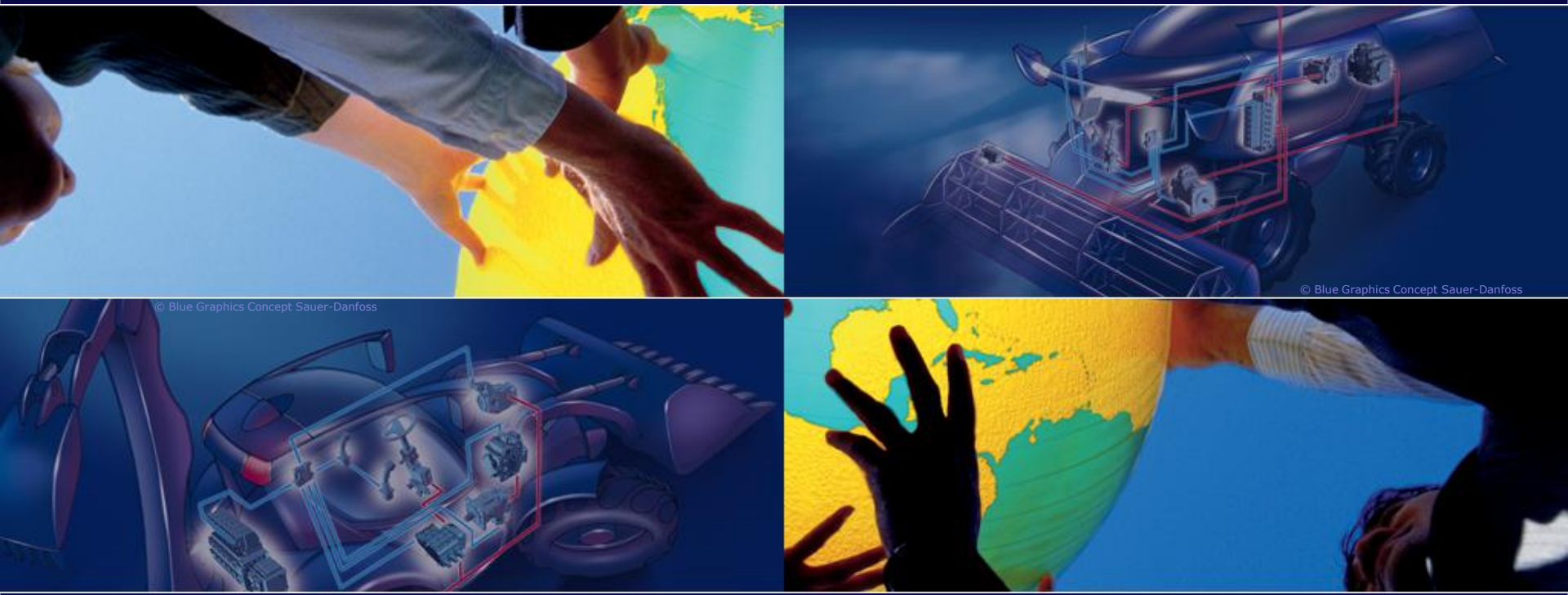
CANopen

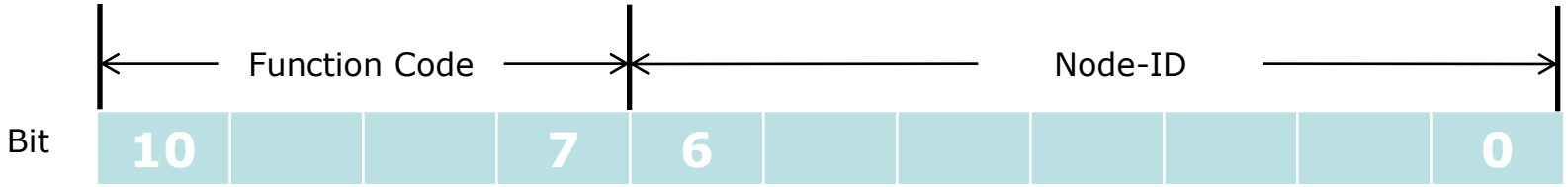

© Blue Graphics Concept Sauer-Danfoss
© Blue Graphics Concept Sauer-Danfoss

CANopen

- NMT – Network Management
  - Serves to configure, initialize and handle errors in a CAN network
- SYNC – Message sent with a certain interval
  - Synchronizes messages
  - No data
- PDO – Process Data Object
  - Data transfer
  - 4 default PDO's: PDO1 – PDO4
- SDO – Service Data Object
  - Provides access to settings of a device

CANopen

How the CAN ID is used in CANopen.



Node-ID range: 1 - 127

CANopen

Object	Function Code (binary)	Resulting CAN-ID (hex)
CAN messages sent to all Nodes (broadcast)		
NMT	0000	0
SYNC	0001	80
Peer-to-peer messages		
EMERGENCY	0001 (80h)	81 – FF
PDO1 (tx)	0011 (180h)	181 – 1FF
PDO1 (rx)	0100 (200h)	201 – 27F
PDO2 (tx)	0101 (280h)	281 – 2FF
PDO2 (rx)	0110 (300h)	301 – 37F
PDO3 (tx)	0111 (380h)	381 – 3FF
PDO3 (rx)	1000 (400h)	401 – 47F
PDO4 (tx)	1001 (480h)	481 – 4FF
PDO4 (rx)	1010 (500h)	501 – 57F
SDO (tx)	1011 (580h)	581 – 5FF
SDO (rx)	1100 (600h)	601 – 67F
NMT Error Control	1110 (700h)	701 – 77F

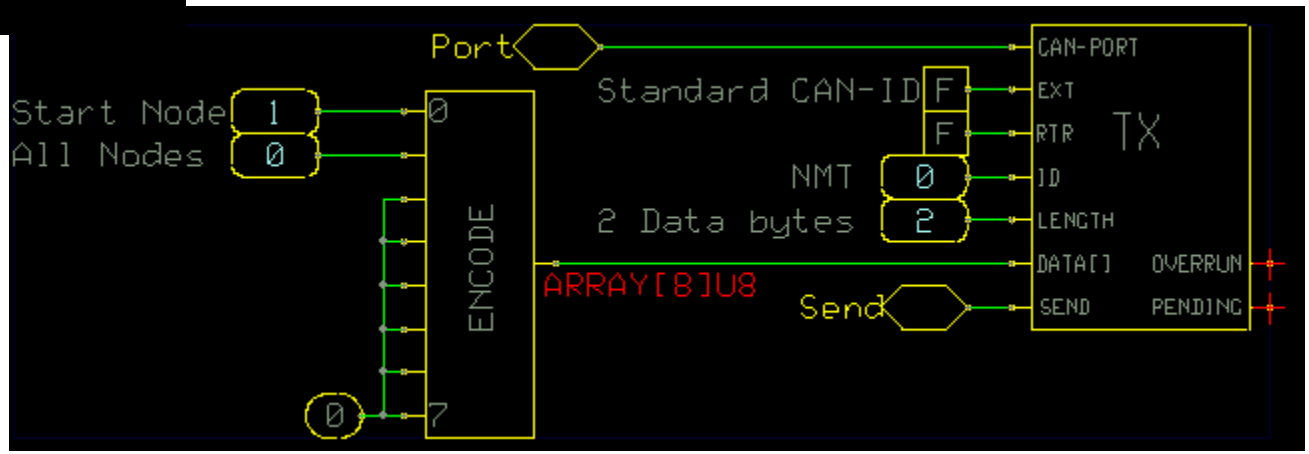
CANopen

- NMT

Command	CAN-ID	Byte 0	Byte 1
Start Node	0	1	Node-ID. (0 = All nodes)
Stop Node	0	2	Node-ID. (0 = All nodes)
Enter Pre-Operational	0	128	Node-ID. (0 = All nodes)
Reset Node	0	129	Node-ID. (0 = All nodes)

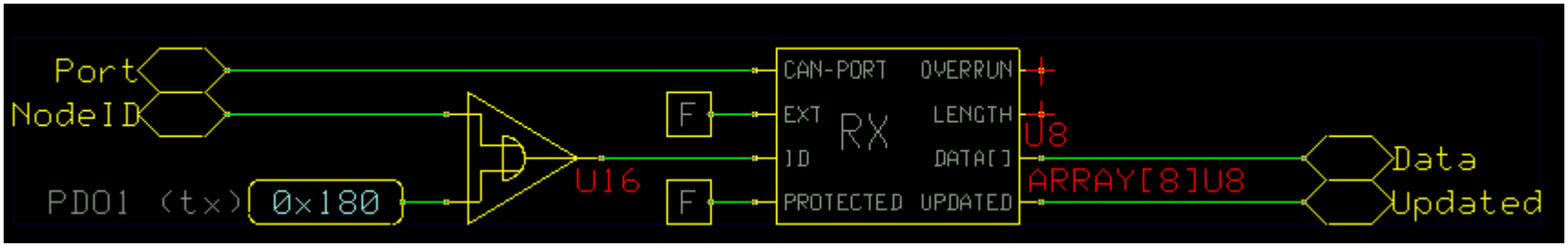
CANopen

- NMT
  - Example



CANopen

- Receive PDO1 (tx)
  - Example



CANopen PDO Mapping

- PDO1 Mapping for Sauer-Danfoss CAN Open Joystick
  - Byte 0
    - Proportional Memory Freeze Status
  - Byte 1
    - Buttons 1-8 Status
  - Byte 2
    - Buttons 9-16 Status
  - Byte 3
    - Buttons 17-24 Status
  - Byte 4
    - Buttons 25-32 Status

CANopen PDO Mapping

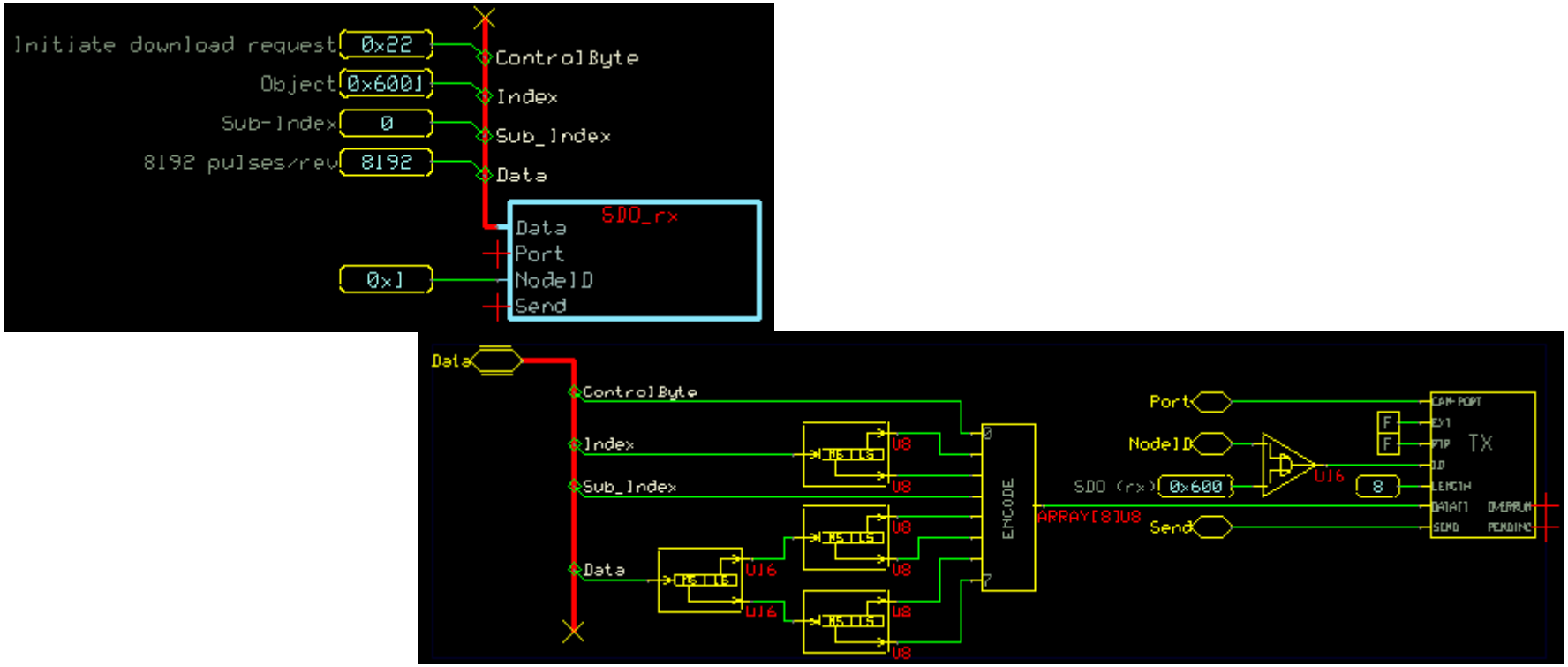
- PDO2 Mapping for Sauer-Danfoss CAN Open Joystick
  - Byte 0 and 1
    - X Axis
  - Byte 2 and 3
    - Y Axis
- PDO3 Mapping for Sauer-Danfoss CAN Open Joystick
  - Byte 0 and 1
    - Grip 1 Proportional
  - Byte 2 and 3
    - Grip 2 Proportional
  - Byte 4 and 5
    - Grip 3 Proportional

CANopen

- SDO
  - Byte 0 - “ControlByte”
    - Example:
    - 0x22 = Download request
    - 0x60 = Download response (acknowledge)
  - Byte 1 and 2 - Object (Index)
    - Example: Object 0x6001 - Number of pulses/rev
  - Byte 3 – Sub-Index
    - Supplementary data to an Object
    - Example: Object 0x1010 Store parameters, Sub-Index 0x1 – Save all parameters
  - Byte 4-7 – Data
    - Example: Object 0x6001, Data 8192 – 8192 pulses/rev

CANopen

- Send SDO (rx)
  - Example



CANopen

- Receive SDO (tx)
  - Example